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⑭ Condensed pyrimidine derivatives, process and intermediates for their preparation and pharmaceutical compositions containing them.

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(56) References cited:

JOURNAL OF MEDICINAL CHEMISTRY, vol. 18, no. 11, 1975, pages 1117-1122, Washington, US; B.J. BROUGHTON et al.: "Antiallergic activity of 2-phenyl-8-azapurin-6-ones"

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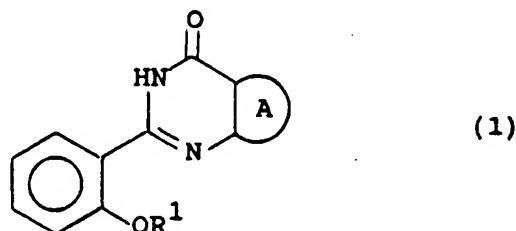
Description

The present invention relates to fused pyrimidine derivatives, processes for their preparation, intermediates in their preparation, their use as therapeutic agents and to pharmaceutica compositions containing them. Fused pyrimidine derivatives having antiallergic activity are described in the Journal of Medicinal Chemistry Vol. 18, 1975, p.1117-1122. The compounds of this invention are inhibitors of a calmodulin insensitive cyclic GMP phosphodiesterase and are of use in combatting such conditions where such inhibition is thought to be beneficial. They are bronchodilators and are therefore of use in combatting chronic reversible obstructive lung diseases such as asthma and bronchitis. Furthermore the compounds of this invention are vasodilators and are therefore of value in combatting angina, hypertension and congestive heart failure.

Accordingly the present invention provides compounds of the formula (1) :

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25 and pharmaceutically acceptable salts thereof, wherein

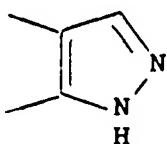
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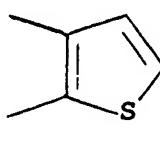
is a ring of sub-formula (a), (b) or (c):

35

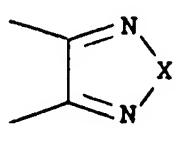
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(a)



(b)



(c),

45 X is oxygen or sulphur, and
R¹ is C₁₋₆alkyl, C₂₋₆alkenyl, C₃₋₅cycloalkylC₁₋₄alkyl, or C₁₋₄alkyl substituted by 1 to 6 fluoro groups.

Suitably R¹ is C₂₋₅alkyl for example ethyl, n-propyl, isopropyl, butyl, isobutyl or pentyl.

Suitably R¹ is C₃₋₅alkenyl for example allyl, butenyl or pentenyl.

Suitably R¹ is cyclopropylmethyl.

Examples of C₁₋₄alkyl substituted by 1 to 6 fluoro groups include -CF₃, -CH₂CF₃ or -CF₂CHFCF₃.

Preferably R¹ is n-propyl.

Suitably

55



is a group of sub-formula (a) thus forming a pyrazolo[3,4-d]pyrimidine ring system.

Suitably

5



is a group of sub-formula (b) thus forming a thieno[2,3-d]pyrimidine ring system.

10 Suitably

15



is a group of sub-formula (c) and X is oxygen thus forming a [1,2,5]oxadiazolo[3,4-d]pyrimidine ring system.

Suitably

20



25 is a group of sub-formula (c) and X is sulphur thus forming a [1,2,5]thiadiazolo[3,4-d]pyrimidine ring system.

Particular compounds of this invention are :

6-(2-propoxyphenyl) pyrazolo[3,4-d]pyrimidin-4(5H)-one,
2-(2-propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one,
2-(2-propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-one, or
30 2-(2-propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-one
or pharmaceutically acceptable salts thereof.

This invention covers all tautomeric and optical isomeric forms of compounds of formula (1).

Compounds of the formula (1) may form pharmaceutically acceptable salts with metal ions, such as alkali metals for example sodium and potassium, or with an ammonium ion.

35 In order to use a compound of the formula (1) or a pharmaceutically acceptable salt thereof for the treatment of humans and other mammals it is normally formulated in accordance with standard pharmaceutical practice as a pharmaceutical composition.

Compounds of formula (1) and their pharmaceutically acceptable salts may be administered in standard manner for the treatment of the indicated diseases, for example orally, sublingually, parenterally, trans-40 dermally, rectally, via inhalation or via buccal administration.

45 Compounds of formula (1) and their pharmaceutically acceptable salts which are active when given orally or via buccal administration can be formulated appropriately in dosage forms such as liquids, syrups, tablets, capsules and lozenges. An oral liquid formulation will generally consist of a suspension or solution of the compound or salt in a liquid carrier for example, ethanol, glycerine or water with a flavouring or colouring agent. Where the composition is in the form of a tablet, any pharmaceutical carrier routinely used for preparing solid formulations may be used. Examples of such carriers include starch, celluloses, lactose, sucrose and magnesium stearate. Where the composition is in the form of a capsule, any routine encapsulation is suitable, for example using the aforementioned carriers in a hard gelatin capsule shell. Where the composition is in the form of a soft gelatin shell capsule any pharmaceutical carrier routinely 50 used for preparing dispersions or suspensions may be considered, for example aqueous gums, celluloses, silicates or oils and are incorporated in a soft gelatin capsule shell.

55 Typical parenteral compositions consist of a solution or suspension of the compound or salt in a sterile aqueous or non-aqueous carrier optionally containing a parenterally acceptable oil, or solubilising agent, for example polyethylene glycol, polyvinylpyrrolidone, 2-pyrrolidone, cyclodextrin, lecithin, arachis oil, or sesame oil.

A typical suppository formulation comprises a compound of formula (1) or a pharmaceutically acceptable salt thereof which is active when administered in this way, with a binding and/or lubricating agent, for example polymeric glycols, gelatins, cocoa-butter or other low melting vegetable waxes or fats or their

synthetic analogues.

Typical transdermal formulations comprise a conventional aqueous or non-aqueous vehicle, for example a cream, ointment, lotion or paste or are in the form of a medicated plaster, patch or membrane.

Typical compositions for inhalation are in the form of a solution, suspension or emulsion that may be 5 administered in the form of an aerosol using a conventional propellant such as dichlorodifluoromethane or trichlorofluoromethane, or are in the form of a powder for insufflation.

Preferably the composition is in unit dosage form, for example a tablet, capsule or metered aerosol dose, so that the patient may administer to himself a single dose.

Each dosage unit for oral administration contains suitably from 0.001 mg/Kg to 30 mg/Kg, and 10 preferably from 0.005 mg/Kg to 15 mg/Kg, and each dosage unit for parenteral administration contains suitably from 0.001 mg/Kg to 10 mg/Kg, of a compound of formula (1) or a pharmaceutically acceptable salt thereof calculated as the free base.

The daily dosage regimen for oral administration is suitably about 0.001 mg/Kg to 120 mg/Kg, of a compound of formula (1) or a pharmaceutically acceptable salt thereof calculated as the free base. The 15 daily dosage regimen for parenteral administration is suitably about 0.001 mg/Kg to 40 mg/Kg, for example about 0.005 mg/Kg to 10 mg/Kg, of a compound of the formula (1) or a pharmaceutically acceptable salt thereof calculated as the free base. The active ingredient may be administered as required for example from 1 to 8 times a day or by infusion. The compositions of the invention are bronchodilators and are useful in chronic reversible obstructive lung disease for example asthma and bronchitis. The compositions of the 20 present invention also have vasodilator activity and are of use in the treatment of angina, hypertension and congestive heart failure. Such conditions can be treated by administration orally, sublingually, topically, rectally, parenterally or by inhalation. For administration by inhalation dosages are controlled by a valve, are administered as required and for an adult are conveniently in the range 0.1-5.0 mg of a compound of the formula (1) or a pharmaceutically acceptable salt thereof.

25 The compounds of this invention may be co-administered with other pharmaceutically active compounds, for example in combination, concurrently or sequentially. Conveniently the compounds of this invention and the other active compound or compounds are formulated in a pharmaceutical composition. Examples of compounds which may be included in pharmaceutical compositions with the compounds of the formula (1) are bronchodilators such as sympathomimetic amines for example isoprenaline, isoetharine, 30 sulbutamol, phenylephrine and ephedrine or xanthine derivatives for example theophylline and aminophylline, anti-allergic agents for example disodium cromoglycate, histamine H₁-antagonists, vasodilators for example hydralazine, angiotensin converting enzyme inhibitors for example captopril, anti-anginal agents for example isosorbide nitrate, glyceryl trinitrate and pentaerythritol tetranitrate, anti-arrhythmic agents for example quinidine, procainamide and lignocaine, calcium antagonists for example verapamil and nifedipine, 35 diuretics such as thiazides and related compounds for example bendrofluazide, chlorothiazide, chlorothalidone, hydrochlorothiazide, and other diuretics for example frusemide and triamterene, and sedatives for example nitrazepam, flurazepam and diazepam.

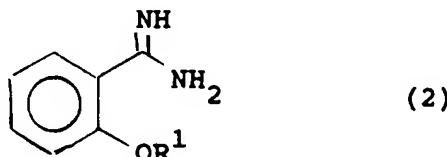
In another aspect the present invention provides a process for the preparation of compounds of the formula (1) or pharmaceutically acceptable salts thereof, which process comprises :

40 a) for compounds wherein

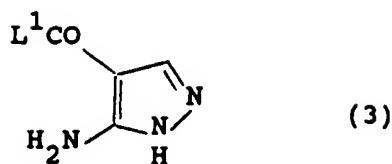


is a group of sub-formula (a), reacting a compound of the formula (2):

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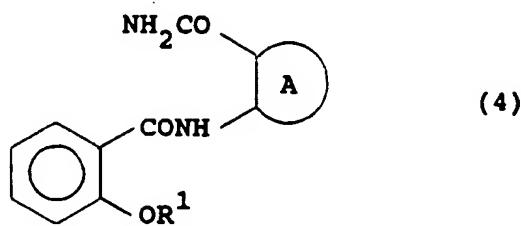
wherein R¹ is as hereinbefore defined with a compound of the formula (3) :



10 wherein L^1 is C_{1-4} alkoxy or amino;
b) for compounds wherein



20 is a group of sub-formula (a) or (b), cyclising a compound of the formula (4) :



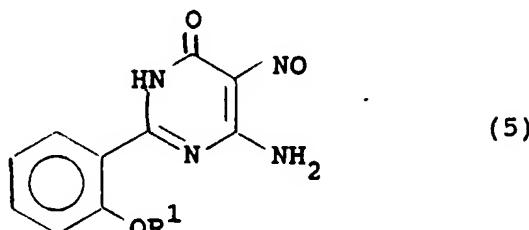
wherein R¹ is as hereinbefore defined and



40 is a group of sub-formula (a) or (b) as hereinbefore defined;
c) for compounds wherein



is a group of sub-formula (c) and X is oxygen, cyclising a compound of the formula (5) :



wherein R¹ is as hereinbefore defined with an oxidising agent;
 d) for compounds wherein

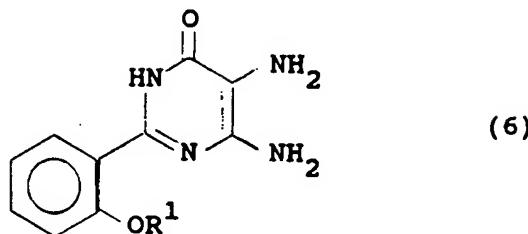
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10 is a group of sub-formula (c) and X is sulphur, reacting a compound of the formula (6) :

15

20



wherein R¹ is as hereinbefore defined with thionyl chloride or a chemical equivalent thereof; and thereafter optionally forming a pharmaceutically acceptable salt.

25 Suitably an acid addition salt of a compound of the formula (2), for example the methanesulphonate or hydrochloride, is reacted with an acid addition salt of a compound of the formula (3), for example the sulphate or hydrochloride, in the presence of a suitable base such as sodium acetate in the absence of a solvent or in a suitable solvent such as a C₁₋₄alcohol, pyridine or N-methylpyrrolidin-2-one at an elevated temperature, for example 50-250 °C.

30 Suitably a compound of the formula (4) is cyclised by heating at an elevated temperature, for example 50-150 °C, in the presence of an acid or a base in a suitable solvent such as aqueous C₁₋₄alcohols, water, toluene, a halohydrocarbon or acetonitrile. Conveniently a compound of the formula (4) is cyclised by heating in aqueous base such as sodium hydroxide at the reflux temperature of the reaction mixture.

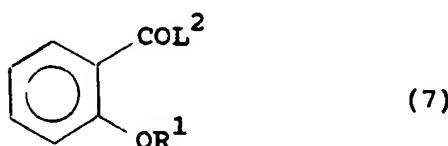
35 Suitably a compound of the formula (5) is reacted with an oxidising agent in a solvent such as acetic acid at a moderate temperature e.g. from 0-80 °C, conveniently at ambient temperature. A suitable oxidising agent is lead tetraacetate.

40 Suitably an acid addition salt of compound of the formula (6), for example the sulphate or hydrochloride, is reacted with excess thionyl chloride or a chemical equivalent thereof in the absence of a solvent or in the presence of a solvent such as a halohydrocarbon at an elevated temperature for example from 50-200 °C, conveniently at the reflux temperature of the reaction mixture. By a chemical equivalent thereof is meant a reagent that will react with a compound of the formula (6) in a similar manner to thionyl chloride to afford a compound of the formula (1) wherein X is sulphur, for example N-thionylaniline (J. Org. Chem., 29, 2135 (1964)).

45 The compounds of the formulae (2), (5) and (6) and acid addition salts thereof are known or preparable in conventional manner from US Patent 3819631.

A compound of the formula (4) can be prepared by reaction of 3-amino-4-pyrazolecarboxamide or 2-aminothiophene-3-carboxamide with a compound of the formula (7):

50



55

wherein R¹ is as hereinbefore defined and L² is halo.

Suitably L² is chloro or bromo. Suitably a compound of the formula (7) is reacted with 3-amino-4-pyrazole-carboxamide at ambient or elevated temperature e.g. 50-100 °C in a suitable solvent such as

toluene, acetonitrile or a halohydrocarbon e.g. chloroform or dichloromethane, optionally in the presence of a base such as pyridine or triethylamine, to form a compound of the formula (4) which may be cyclised in situ or may be isolated and thereafter cyclised as hereinbefore described.

5 Pharmaceutically acceptable base addition salts of the compounds of the formula (1) may be prepared by standard methods, for example by reacting a solution of the compound of the formula (1) with a solution of the base.

The following biological test method, data and Examples serve to illustrate this invention.

Bronchodilatation - In vivo

10

Male guinea-pigs of the Dunkin Hartley strain (500 - 600g) were anaesthetised with Sagatal (pentobarbital sodium) (60 mg/kg). Airway resistance was measured using a modification of the classical Konzett-Rossler technique (J. Pharm. Methods, 13, 309-315, 1985). U46619 (9,11-methanoepoxy-PGH₂) was infused i.v. at a rate of 2.5 nmol/min, this produced a steady state of bronchoconstriction (approximately 120% increase from basal airway resistance). The compound under test was administered by i.v. bolus injection, and the subsequent peak inhibition of bronchoconstriction recorded.

15 The dose of compound required to reduce the U46619-induced bronchoconstriction by 50% is given as the BD₅₀. This result demonstrates *in vivo* anti-bronchoconstrictor activity.

20

Compound of Example	BD ₅₀ (μmol/kg)
1	5.13
2	2.62
4	4.51

25

Example 1

30

6-(2-Propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-one

35

A stirred mixture of 2-propoxybenzamidine methane-sulphonate (1.0 g), 3-amino-4-pyrazolecarboxamide sulphate (0.5 g) and sodium acetate (0.82 g) was heated in an oil bath (180 °C) for one hour. The reaction mixture was dissolved in hot 2 Normal sodium hydroxide (10 ml) and the solution was treated with charcoal and neutralised with glacial acetic acid. A precipitate was collected, washed with water and eluted from a silica column with chloroform. The combined fractions containing product were evaporated to dryness to afford the title compound, 148 mg, m.p. 182-183.5 °C.

40

Example 2

2-(2-Propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one

45

a) A solution of 2-propoxybenzoyl chloride (0.99 g) in acetonitrile (7.5 ml) was added dropwise over 5 minutes to a cooled (0 °C), stirred mixture of 2-aminothiophene-3-carboxamide (0.71 g) and triethylamine (0.51 g) in acetonitrile (7.5 ml). The reaction mixture was stirred for one hour while being allowed to warm to ambient temperature and was then allowed to stand overnight. Acetonitrile was removed under reduced pressure and the residue was washed with water and recrystallised from ethanol-water to afford 2-(2-propoxybenzamido)thiophene-3-carboxamide, 0.91 g, m.p. 176.5-178.5 °C.

50

b) A stirred mixture of 2-(2-propoxybenzamido)thiophene-3-carboxamide (0.90 g) and pyridine (1 ml) in 2 Normal sodium hydroxide (25 ml) was heated under reflux for 2 hours. The cooled reaction mixture was neutralised with concentrated hydrochloric acid to afford a precipitate and the resulting mixture was extracted with chloroform (3 x 25 ml). The combined extracts were washed with water (20 ml) and brine (20 ml), dried (magnesium sulphate) and evaporated under reduced pressure to afford a crude product which was recrystallised from ethanol-water to afford the title compound, 0.41 g, m.p. 115-117 °C.

55

Example 3**2-(2-Propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-one**

5 Lead tetraacetate (1 g) was added portionwise over 5 minutes to a stirred solution of 4-amino-5-nitroso-2-(2-propoxyphenyl)pyrimidin-6-one (0.52 g) in acetic acid (10 ml) under nitrogen. The reaction mixture was stirred for 1.5 hours and then allowed to stand overnight. A precipitate was collected, washed with water, dissolved in hot methanol and treated with charcoal. The methanolic solution was filtered through diatomaceous earth and the filtrate was evaporated under reduced pressure to afford a residue which was
10 recrystallised from methanol to afford the title compound, 0.19 g, m.p. 163-164 °C.

Example 4**2-(2-Propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-one**

15 A stirred solution of 4,5-diamino-2-(2-propoxyphenyl)pyrimidin-6-one sulphate (0.72 g) in thionyl chloride (25 ml) was heated under reflux for 2 hours. The cooled reaction mixture was evaporated under reduced pressure and the residue was washed with water and recrystallised from methanol-water and then from methanol to afford the title compound, 0.38 g, m.p. 157.5-158.5 °C.

Example 5

20 Pharmaceutical compositions for oral administration are prepared by combining the following :

		% w/w		
		0.5	3.0	7.14
	2-(2-Propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one	90.45	88.2	84.41
	2% w/w Soya lecithin in soya bean oil	9.05	8.8	8.45
	Hydrogenated vegetable shortening and beeswax			

30 The formulations are then filled into individual soft gelatin capsules.

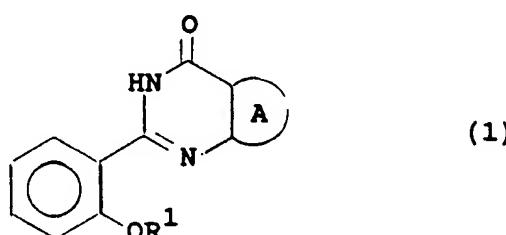
Example 6

35 A pharmaceutical composition for parenteral administration is prepared by dissolving the title compound of Example 4 (0.02 g) in polyethylene glycol 300 (25 ml) with heating. This solution is then diluted with water for injections Ph. Eur. (to 100 ml). The solution is then sterilised by filtration through a 0.22 micron membrane filter and sealed in sterile containers.

40 Claims

Claims for the following Contracting States : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

45 1. A compound of the formula (1) :



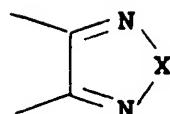
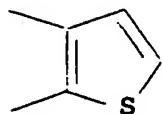
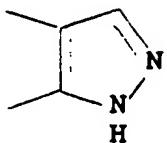
55 or a pharmaceutically acceptable salt thereof, wherein



5

is a ring of sub-formula (a), (b) or (c):

10



15

(a)

(b)

(c),

20

X is oxygen or sulphur, and

R¹ is C₁₋₆alkyl, C₂₋₆alkenyl, C₃₋₅cycloalkylC₁₋₄alkyl, or C₁₋₄alkyl substituted by 1 to 6 fluoro groups.

2. A compound according to claim 1 wherein R¹ is C₂₋₅alkyl.

25 3. A compound according to claim 1 wherein R¹ is n-propyl.

4. A compound according to any one of claims 1 to 3 where

30



is a group of sub-formula (a).

35

5. A compound according to any one of claims 1 to 3 where

40



is a group of sub-formula (b).

45 6. A compound according to any one of claims 1 to 3 where

50



is a group of sub-formula (c) and X is oxygen.

55

7. A compound according to any one of claims 1 to 3 where

5



is a group of sub-formula (c) and X is sulphur.

10 8. A compound according to claim 1 which is :

6-(2-propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-one,
2-(2-propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one,
2-(2-propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-one, or
2-(2-propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-one,
or a pharmaceutically acceptable salt thereof.

15 9. A compound according to any one of claims 1 to 8 for use as a medicament.

10 10. A pharmaceutical composition which comprises a compound according to any one of claims 1 to 8 and
20 a pharmaceutically acceptable carrier.

11. A process for preparing a compound of the formula (1) or a pharmaceutically acceptable salt thereof as
defined in claim 1 which comprises :

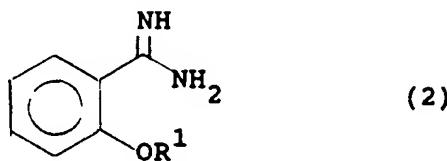
a) for compounds wherein

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30 is a group of sub-formula (a), reacting a compound of the formula (2):

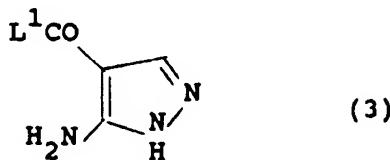
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wherein R¹ is as defined in claim 1 with a compound of the formula (3) :

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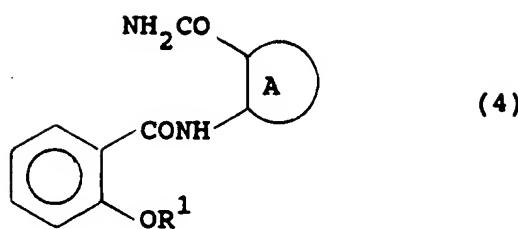
wherein L¹ is C₁₋₄alkoxy or amino;
b) for compounds wherein

55



is a group of sub-formula (a) or (b), cyclising a compound of the formula (4) :

5



10

wherein R¹ is as hereinbefore defined and

15



is a group of sub-formula (a) or (b) as defined in claim 1;
c) for compounds wherein

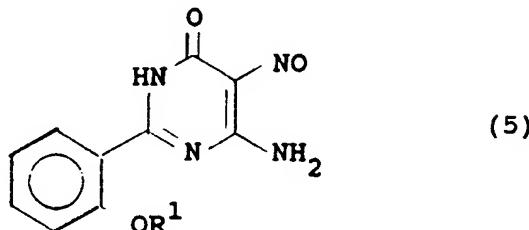
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is a group of sub-formula (c) and X is oxygen, cyclising a compound of the formula (5) :

30



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wherein R¹ is as hereinbefore defined with an oxidising agent;
d) for compounds wherein

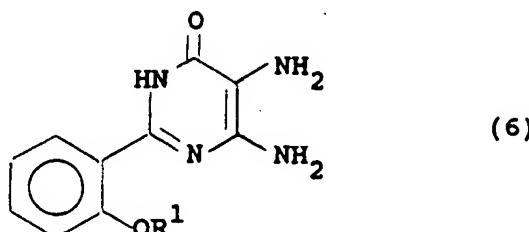
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is a group of sub-formula (c) and X is sulphur, reacting a compound of the formula (6) :

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wherein R¹ is as hereinbefore defined with thionyl chloride or a chemical equivalent thereof; and thereafter optionally forming a pharmaceutically acceptable salt.

12. A compound of the formula (4):

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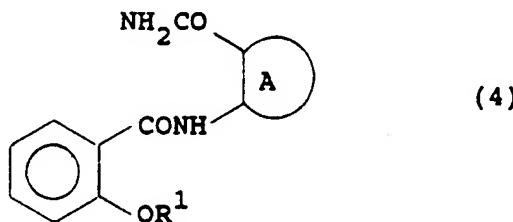
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wherein

R¹ is C₁-₆alkyl, C₂-₆alkenyl, C₃-₅cycloalkylC₁-₄alkyl, or C₁-₄alkyl substituted by 1 to 6 fluoro groups and

wherein

20



25

is a ring of sub-formula (a) or (b)

30



35

(a)

(b)

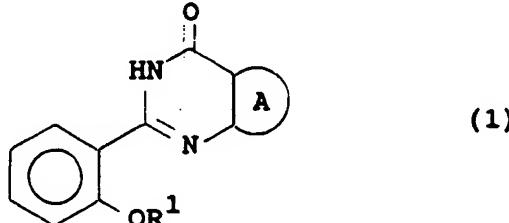
Claims for the following Contracting State : ES

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1. A process for preparing a compound of the formula (1) :

45

50



or a pharmaceutically acceptable salt thereof, wherein

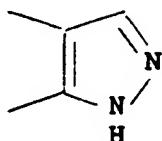
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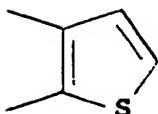
is a ring of sub-formula (a), (b) or (c):

10

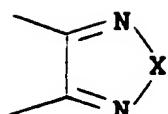


15

(a)



(b)



(c),

20

X is oxygen or sulphur, and

20

R¹ is C₁-₆alkyl, C₂-₆alkenyl, C₃-₅cycloalkylC₁-₄alkyl, or C₁-₄alkyl substituted by 1 to 6 fluoro groups,

which process comprises:

a) for compounds wherein

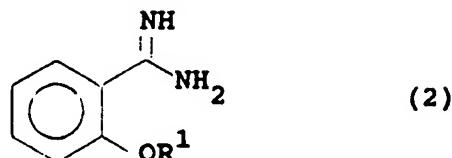
25



30

is a group of sub-formula (a), reacting a compound of the formula (2):

35

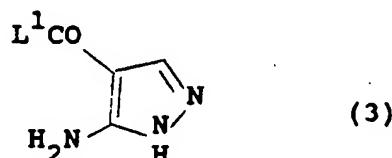


(2)

40

wherein R¹ is as hereinbefore defined with a compound of the formula (3) :

45



(3)

50

wherein L¹ is C₁-₄alkoxy or amino;

b) for compounds wherein

55



is a group of sub-formula (a) or (b), cyclising a compound of the formula (4) :

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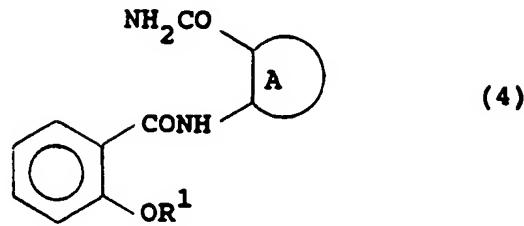
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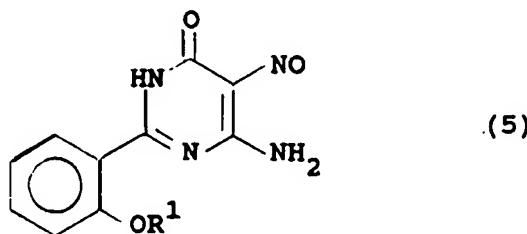
wherein R¹ is as hereinbefore defined and



is a group of sub-formula (a) or (b) as defined in claim 1;
c) for compounds wherein



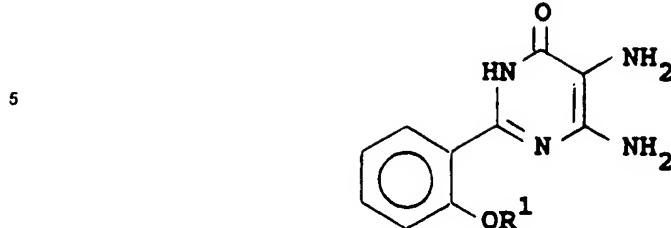
is a group of sub-formula (c) and X is oxygen, cyclising a compound of the formula (5) :



wherein R¹ is as hereinbefore defined with an oxidising agent;
d) for compounds wherein



is a group of sub-formula (c) and X is sulphur, reacting a compound of the formula (6) :



wherein R¹ is as hereinbefore defined with thionyl chloride or a chemical equivalent thereof; and thereafter optionally forming a pharmaceutically acceptable salt.

15 2. A process according to claim 1 for preparing a compound wherein R¹ is C₂-5alkyl.

3. A process according to claim 1 for preparing a compound wherein R¹ is n-propyl.

4. A process according to any one of claims 1 to 3 for preparing a compound wherein

20



25 is a group of sub-formula (a).

5. A process according to any one of claims 1 to 3 for preparing a compound wherein



35 is a group of sub-formula (b).

6. A process according to any one of claims 1 to 3 for preparing a compound wherein



is a group of sub-formula (c) and X is oxygen.

7. A process according to any one of claims 1 to 3 for preparing a compound wherein

45

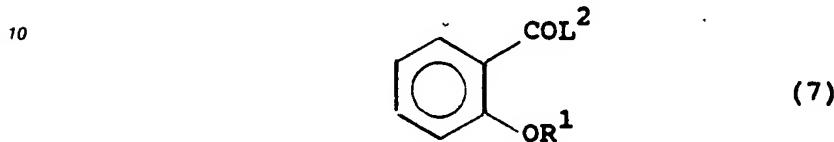


50 is a group of sub-formula (c) and X is sulphur.

8. A process according to claim 1 for preparing a compound which is :
 6-(2-propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-one,
 2-(2-propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one,
 2-(2-propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-one, or
 2-(2-propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-one,
 or a pharmaceutically acceptable salt thereof.

9. A process for preparing a pharmaceutical composition which comprises bringing into association a compound of the formula (1) as defined in any one of claims 1 to 8 and a pharmaceutically acceptable carrier.

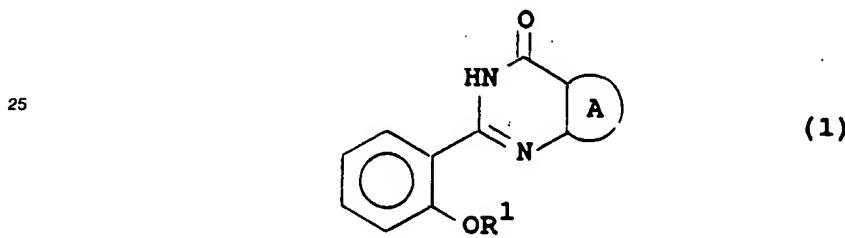
5 10. A process for preparing a compound of the formula (4) as defined in claim 1 which comprises reacting 3-amino-4-pyrazolecarboxamide or 2-aminothiophene-3-carboxamide with a compound of the formula (7):



15 wherein R¹ is as defined in claim 1 and L² is halo.

Claims for the following Contracting State : GR

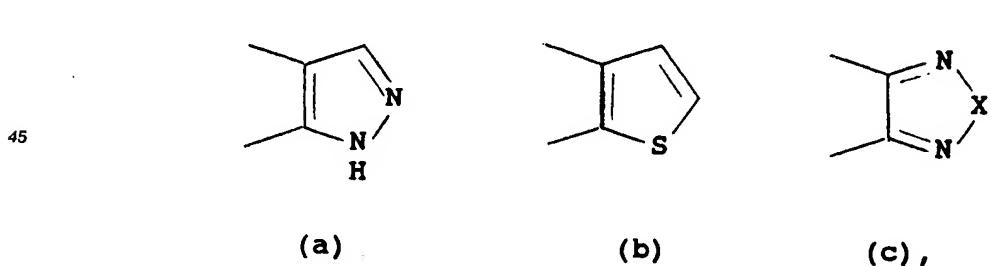
20 1. A process for preparing a compound of the formula (1) :



or a pharmaceutically acceptable salt thereof, wherein



40 is a ring of sub-formula (a), (b) or (c):



X is oxygen or sulphur, and
 R¹ is C₁-₆alkyl, C₂-₆alkenyl, C₃-₅cycloalkylC₁-₄alkyl, or C₁-₄alkyl substituted by 1 to 6 fluoro groups,
 55 which process comprises:

a) for compounds wherein

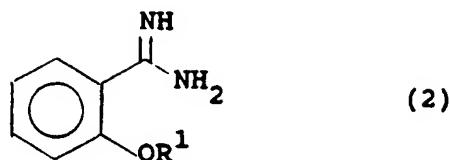
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is a group of sub-formula (a), reacting a compound of the formula (2):

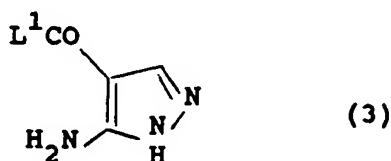
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wherein L¹ is C₁-₄alkoxy or amino;

30

b) for compounds wherein

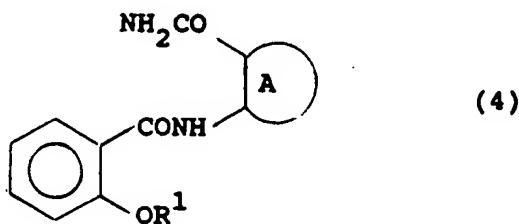
35



is a group of sub-formula (a) or (b), cyclising a compound of the formula (4):

40

45



50

wherein R¹ is as hereinbefore defined and

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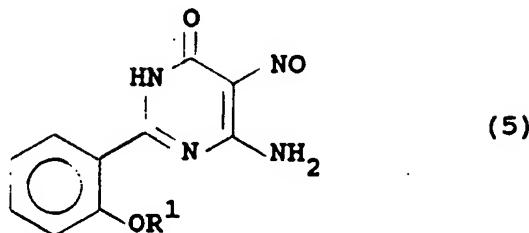
is a group of sub-formula (a) or (b) as defined in claim 1;

5 c) for compounds wherein



10 is a group of sub-formula (c) and X is oxygen, cyclising a compound of the formula (5) :

15



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wherein R¹ is as hereinbefore defined with an oxidising agent;

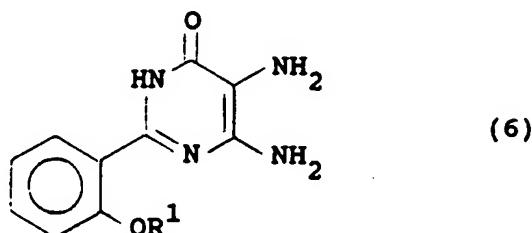
d) for compounds wherein

25



30 is a group of sub-formula (c) and X is sulphur, reacting a compound of the formula (6) :

35



40

wherein R¹ is as hereinbefore defined with thionyl chloride or a chemical equivalent thereof; and thereafter optionally forming a pharmaceutically acceptable salt.

45

2. A process according to claim 1 for preparing a compound wherein R¹ is C₂-5alkyl.

3. A process according to claim 1 for preparing a compound wherein R¹ is n-propyl.

4. A process according to any one of claims 1 to 3 for preparing a compound wherein

50



55 is a group of sub-formula (a).

5. A process according to any one of claims 1 to 3 for preparing a compound wherein



5

is a group of sub-formula (b).

6. A process according to any one of claims 1 to 3 for preparing a compound wherein

10



15 is a group of sub-formula (c) and X is oxygen.

7. A process according to any one of claims 1 to 3 for preparing a compound wherein

20



is a group of sub-formula (c) and X is sulphur.

25 8. A process according to claim 1 for preparing a compound which is :

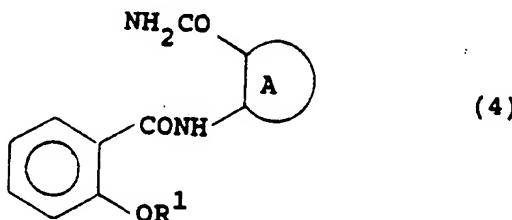
6-(2-propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-one,
2-(2-propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-one,
2-(2-propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-one, or
2-(2-propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-one,
30 or a pharmaceutically acceptable salt thereof.

9. A process for preparing a pharmaceutical composition which comprises bringing into association a compound of the formula (1) as defined in any one of claims 1 to 8 and a pharmaceutically acceptable carrier.

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10. A compound of the formula (4):

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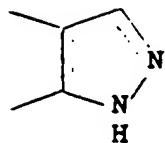
wherein

50



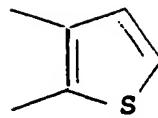
55 is a ring of sub-formula (a) or (b) :

5



(a)

10



(b)

15

and

R¹ is C₁-₆alkyl, C₂-₆alkenyl, C₃-₅cycloalkylC₁-₄alkyl, or C₁-₄alkyl substituted by 1 to 6 fluoro groups.

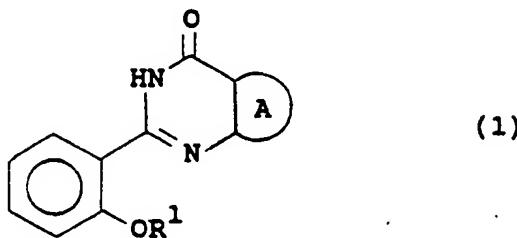
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Patentansprüche**Patentansprüche für folgende Vertragsstaaten : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE**

1. Verbindung der Formel (1):

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oder ein pharmazeutisch verträgliches Salz davon, in der

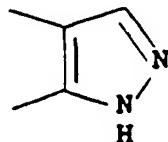
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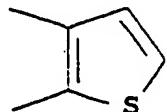
ein Ring der Unterformel (a), (b) oder (c):

40

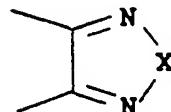
45



(a)



(b)



(c),

50

ist,

X ein Sauerstoff- oder Schwefelatom ist, und

R¹ ein C₁-₆-Alkyl-, C₂-₆-Alkenyl-, C₃-₅-Cycloalkyl-C₁-₄-alkyl- oder C₁-₄-Alkylrest ist, der mit 1 bis 6 Fluoratomen substituiert ist.

55

2. Verbindung nach Anspruch 1, in der R¹ ein C₂-₅-Alkylrest ist.3. Verbindung nach Anspruch 1, in der R¹ eine n-Propylgruppe ist.

4. Verbindung nach einem der Ansprüche 1 bis 3, in der

5



eine Gruppe der Unterformel (a) ist.

10 5. Verbindung nach einem der Ansprüche 1 bis 3, in der

15



eine Gruppe der Unterformel (b) ist.

6. Verbindung nach einem der Ansprüche 1 bis 3, in der

20



25

eine Gruppe der Unterformel (c) und X ein Sauerstoffatom ist.

7. Verbindung nach einem der Ansprüche 1 bis 3, in der

30



35

eine Gruppe der Unterformel (c) und X ein Schwefelatom ist.

8. Verbindung nach Anspruch 1, nämlich:

6-(2-Propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-on,
2-(2-Propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-on,

40 2-(2-Propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-on, oder
2-(2-Propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-on
oder ein pharmazeutisch verträgliches Salz davon.

9. Verbindung nach einem der Ansprüche 1 bis 8 zur Verwendung als Medikament.

45

10. Arzneimittel, umfassend eine Verbindung nach einem der Ansprüche 1 bis 8 und einen pharmazeutisch verträglichen Träger.

50 11. Verfahren zur Herstellung einer Verbindung der Formel (1) oder eines pharmazeutisch verträglichen Salzes davon nach Anspruch 1, umfassend:

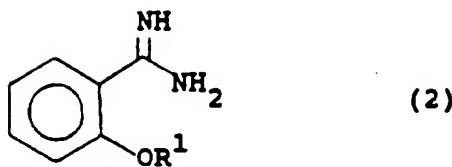
a) für Verbindungen, in denen

55



eine Gruppe der Unterformel (a) ist, Umsetzung einer Verbindung der Formel (2):

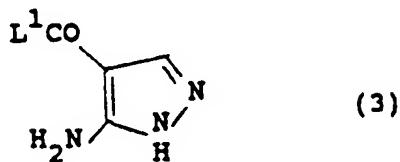
5



10

in der R¹ die in Anspruch 1 angegebene Bedeutung hat, mit einer Verbindung der Formel (3):

15



20

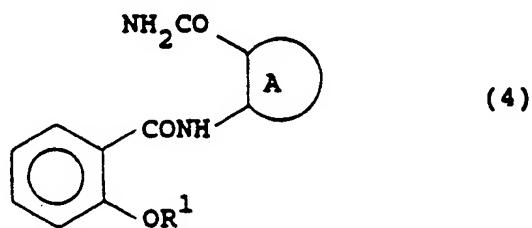
in der L¹ ein C₁–₄-Alkoxyrest oder eine Aminogruppe ist;
b) für Verbindungen, in denen

25



eine Gruppe der Unterformel (a) oder (b) ist, Cyclisieren einer Verbindung der Formel (4):

30



35

40

in der R¹ die vorstehend angegebene Bedeutung hat,
und

45



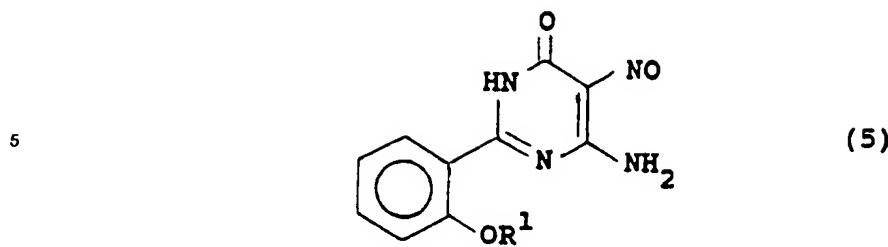
eine Gruppe der Unterformel (a) oder (b) nach Anspruch 1 ist;
c) für Verbindungen, in denen

50



55

eine Gruppe der Unterformel (c) und X ein Sauerstoffatom ist, Cyclisieren einer Verbindung der Formel (5):



10

in der R¹ die vorstehend angegebene Bedeutung hat, mit einem Oxidationsmittel;
d) für Verbindungen, in denen

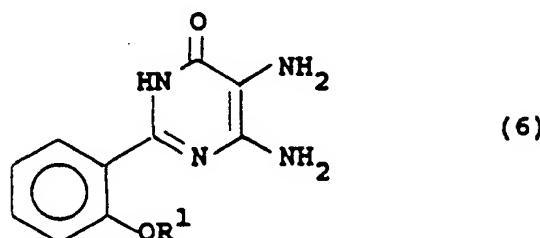
15



eine Gruppe der Unterformel (c) und X ein Schwefelatom ist, Umsetzung einer Verbindung der Formel (6):

20

25



30

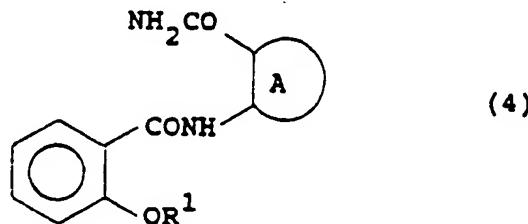
in der R¹ die vorstehend angegebene Bedeutung hat, mit Thionylchlorid oder einem chemischen Äquivalent davon;
und anschließend gegebenenfalls Bilden eines pharmazeutisch verträglichen Salzes.

35

12. Verbindung der Formel (4):

40

45



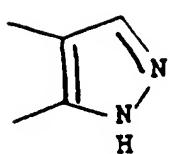
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55

in der R¹ ein C₁–₆-Alkyl-, C₂–₆-Alkenyl-, C₃–₅-Cycloalkyl-C₁–₄-alkyl- oder C₁–₄-Alkylrest ist, der mit 1 bis 6 Fluoratomen substituiert ist, und in der

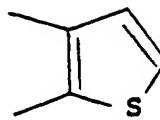


5



(a)

10



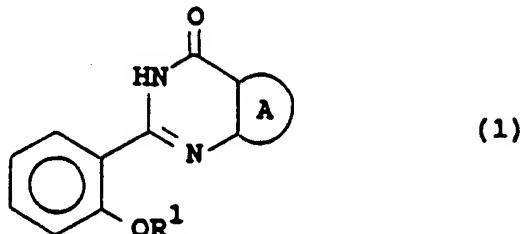
(b)

15

Patentansprüche für folgenden Vertragsstaat : ES

1. Verfahren zur Herstellung einer Verbindung der Formel (1):

20



25

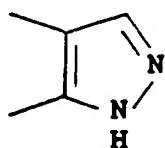
30 oder eines pharmazeutisch verträglichen Salzes davon, in
der

35

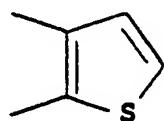


ein Ring der Unterformel (a), (b) oder (c):

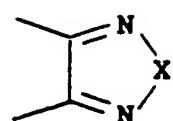
40



(a)



(b)



(c),

45

50 ist,

X ein Sauerstoff- oder Schwefelatom ist, und

R^1 ein C₁–₆-Alkyl-, C₂–₆-Alkenyl-, C₃–₅-Cycloalkyl-C₁–₄-alkyl- oder C₁–₄-Alkylrest ist, der mit 1 bis 6 Fluoratomen substituiert ist, umfassend:

55

a) für Verbindungen, in denen

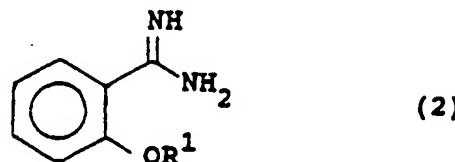
5



eine Gruppe der Unterformel (a) ist, Umsetzung einer Verbindung der Formel (2):

10

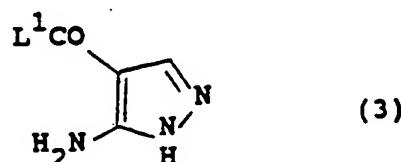
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20

in der R1 die vorstehend angegebene Bedeutung hat, mit einer Verbindung der Formel (3):

25



30

in der L1 ein C1-4-Alkoxyrest oder eine Aminogruppe ist;
b) für Verbindungen, in denen

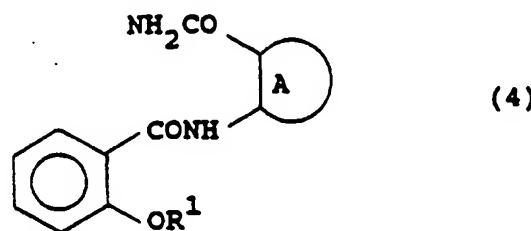
35



eine Gruppe der Unterformel (a) oder (b) ist, cyclisieren einer Verbindung der Formel (4):

40

45



50

in der R1 die vorstehend angegebene Bedeutung hat,
und

55



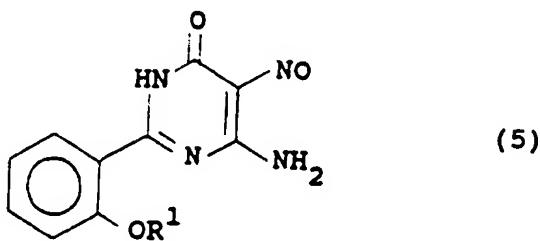
eine Gruppe der Unterformel (a) oder (b) wie vorstehend definiert ist;
c) für Verbindungen, in denen

5



10 eine Gruppe der Unterformel (c) und X ein Sauerstoffatom ist, Cyclisieren einer Verbindung der Formel (5):

15



20

in der R¹ die vorstehend angegebene Bedeutung hat, mit einem Oxidationsmittel;
d) für Verbindungen, in denen

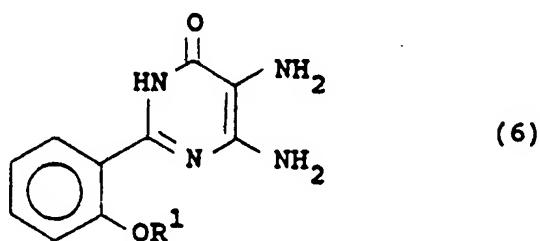
25



30

eine Gruppe der Unterformel (c) und X ein Schwefelatom ist, Umsetzung einer Verbindung der Formel (6):

35



40

in der R¹ die vorstehend angegebene Bedeutung hat, mit Thionylchlorid oder einem chemischen Äquivalent davon;
und anschließend gegebenenfalls Bilden eines pharmazeutisch verträglichen Salzes.

2. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, in der R¹ ein C₂-5-Alkylrest ist.
- 50 3. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, in der R¹ eine n-Propylgruppe ist.
4. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

55



eine Gruppe der Unterformel (a) ist.

5. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

5



10 eine Gruppe der Unterformel (b) ist.

6. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

15



eine Gruppe der Unterformel (c) und X ein Sauerstoffatom ist.

20

7. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

25



eine Gruppe der Unterformel (c) und X ein Schwefelatom ist.

30

8. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, nämlich:

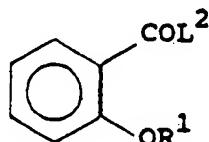
6-(2-Propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-on,
2-(2-Propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-on,
2-(2-Propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-on, oder
35 2-(2-Propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-on
oder ein pharmazeutisch verträgliches Salz davon.

9. Verfahren zur Herstellung eines Arzneimittels, umfassend das Zusammenbringen einer Verbindung der Formel (1) nach einem der Ansprüche 1 bis 8 und eines pharmazeutisch verträglichen Trägers.

40

10. Verfahren zur Herstellung einer Verbindung der Formel (4) nach Anspruch 1, umfassend die Umsetzung von 3-Amino-4-pyrazolcarboxamid oder 2-Aminothiophen-3-carboxamid mit einer Verbindung der Formel (7):

45



(7)

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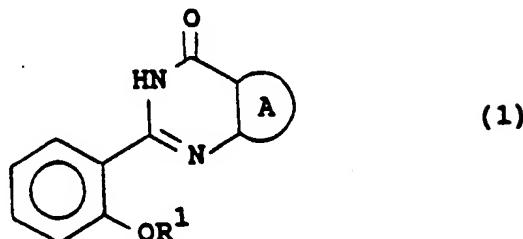
in der R^1 die in Anspruch 1 angegebene Bedeutung hat und L^2 ein Halogenatom ist.

55

Patentansprüche für folgenden Vertragsstaat : GR

1. Verfahren zur Herstellung einer Verbindung der Formel (1):

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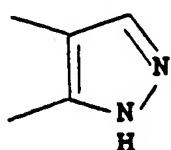
15 oder eines pharmazeutisch verträglichen Salzes davon, in
der

20

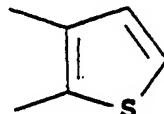


25 ein Ring der Unterformel (a), (b) oder (c):

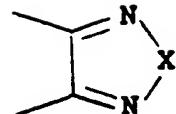
25



(a)



(b)



(c),

35

ist,

X ein Sauerstoff- oder Schwefelatom ist, und

40 R¹ ein C₁-₆-Alkyl-, C₂-₆-Alkenyl-, C₃-₅-Cycloalkyl-C₁-₄-alkyl- oder C₁-₄-Alkylrest ist, der mit 1 bis 6
Fluoratomen substituiert ist, umfassend:

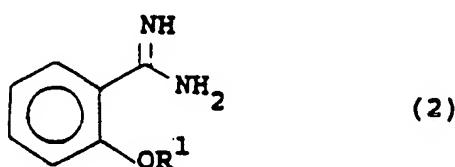
a) für Verbindungen, in denen

45



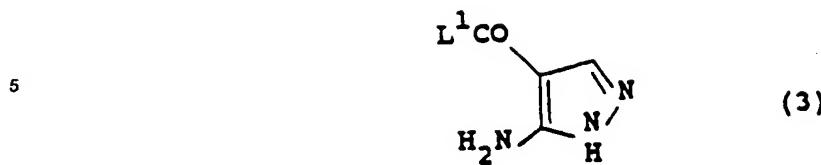
50 eine Gruppe der Unterformel (a) ist, Umsetzung einer Verbindung der Formel (2):

50



55

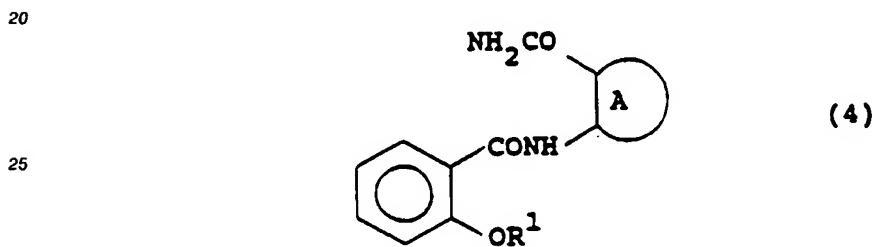
in der R¹ die vorstehend angegebene Bedeutung hat, mit einer Verbindung der Formel (3):



10 in der L¹ ein C₁–₄-Alkoxyrest oder eine Aminogruppe ist;
b) für Verbindungen, in denen



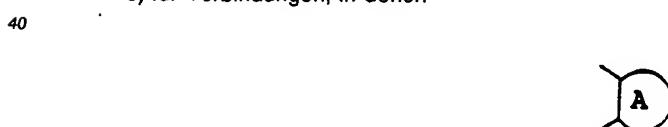
eine Gruppe der Unterformel (a) oder (b) ist, Cyclisieren einer Verbindung der Formel (4):



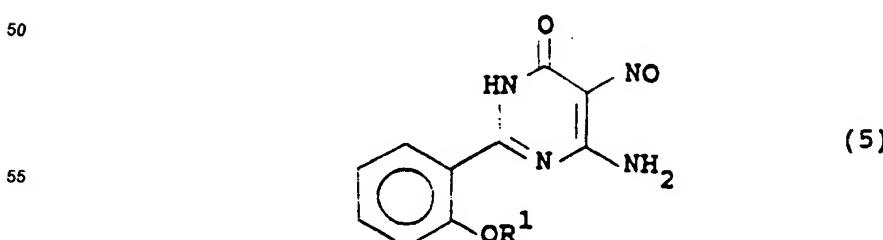
30 in der R¹ die vorstehend angegebene Bedeutung hat,
und



eine Gruppe der Unterformel (a) oder (b) wie vorstehend definiert ist;
c) für Verbindungen, in denen



45 eine Gruppe der Unterformel (c) und X ein Sauerstoffatom ist, Cyclisieren einer Verbindung der Formel (5) :



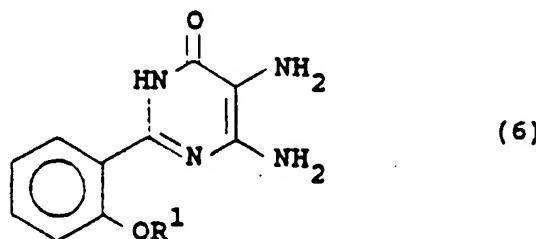
in der R¹ die vorstehend angegebene Bedeutung hat, mit einem Oxidationsmittel;
d) für Verbindungen, in denen

5



10 eine Gruppe der Unterformel (c) und X ein Schwefelatom ist, Umsetzung einer Verbindung der Formel (6):

15



20

in der R¹ die vorstehend angegebene Bedeutung hat, mit Thionylchlorid oder einem chemischen Äquivalent davon;

30 2. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, in der R¹ ein C₂₋₅-Alkylrest ist.

3. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, in der R¹ eine n-Propylgruppe ist.

4. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

35



eine Gruppe der Unterformel (a) ist.

40 5. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der



eine Gruppe der Unterformel (b) ist.

50 6. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung in der



eine Gruppe der Unterfermel (c) und X ein Sauerstoffatom ist

7. Verfahren nach einem der Ansprüche 1 bis 3 zur Herstellung einer Verbindung, in der

5



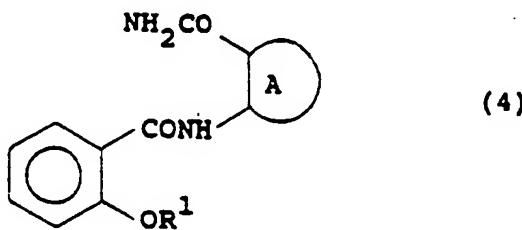
eine Gruppe der Unterformel (c) und X ein Schwefelatom ist.

10 8. Verfahren nach Anspruch 1 zur Herstellung einer Verbindung, nämlich:
 6-(2-Propoxyphenyl)pyrazolo[3,4-d]pyrimidin-4(5H)-on,
 2-(2-Propoxyphenyl)thieno[2,3-d]pyrimidin-4(3H)-on,
 2-(2-Propoxyphenyl)[1,2,5]oxadiazolo[3,4-d]pyrimidin-4(3H)-on, oder
 2-(2-Propoxyphenyl)[1,2,5]thiadiazolo[3,4-d]pyrimidin-4(3H)-on
 15 oder ein pharmazeutisch verträgliches Salz davon.

9. Verfahren zur Herstellung eines Arzneimittels, umfassend das Zusammenbringen einer Verbindung der Formel (1) nach einem der Ansprüche 1 bis 8 und eines pharmazeutisch verträglichen Trägers.

20 10. Verbindung der Formel (4):

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in der

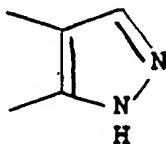
35



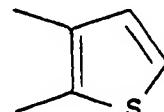
40

ein Ring der Unterformel (a) oder (b):

45



(a)



(b)

50

ist

und R¹ ein C₁₋₆-Alkyl-, C₂₋₆-Alkenyl-, C₃₋₅-Cycloalkyl-C₁₋₄-alkyl- oder C₁₋₄-Alkylrest ist, der mit 1 bis 6 Fluoratomen substituiert ist.

55

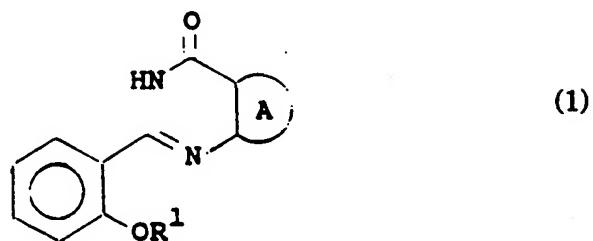
Revendications

Revendications pour les Etats contractants suivants : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

1. Composé de formule (1) :

5

10



15

ou sel de celui-ci acceptable du point de vue pharmaceutique, dans laquelle :

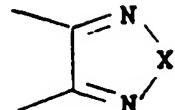
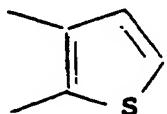
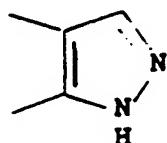
20



est un cycle représenté par la sous-formule (a), (b) ou (c) :

25

30



(a)

(b)

(c),

35

X est un atome d'oxygène ou de soufre, et
 R^1 est un dupe alkyle en C_{1-6} , alcényle en C_{2-6} , cycloalkyl-(en C_{3-5})-alkyle en C_{1-4} , ou un coupe alkyle en C_{1-4} substitué par 1 à 6 atomes de fluor.

40

2. Composé suivant la revendication 1, dans lequel R^1 est un groupe alkyle en C_{2-5} .3. Composé suivant la revendication 1, dans lequel R^1 est un groupe n-propyle.

4. Composé suivant l'une quelconque des revendications 1 à 3, dans lequel

45



50

est un groupe de sous-formule (a).

5. Composé suivant l'une quelconque des revendications 1 à 3, dans lequel

55



est un groupe de sous-formule (b).

6. Composé suivant l'une quelconque des revendications 1 à 3, dans lequel

5



10 est un groupe de sous-formule (c) et X est un atome d'oxygène.

7. Composé suivant l'une quelconque des revendications 1 à 3, dans lequel

15



est un groupe de sous-formule (c) et X est un atome de soufre.

20 8. Composé suivant la revendication 1, qui est :

la 6-(2-propoxyphényl)-pyrazolo-[3,4-d]-4(5H)-one,
 la 6-(2-propoxyphényl)-thiéno-[2,3-d]-4(3H)-one,
 la 6-(2-propoxphényl)-[1,2,5]-oxadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
 la 6-(2-propoxyphényl)-[1,2,5]-thiadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
 25 ou un sel de celles-ci acceptable du point de vue pharmaceutique.

9. Composé suivant l'une quelconque des revendications 1 à 8, utilisable comme médicament.

10. Composition pharmaceutique, qui comprend un composé suivant l'une quelconque des revendications 30 1 à 8 et un support acceptable du point de vue pharmaceutique.

11. Procédé pour préparer un composé de formule (1) ou un sel de celui-ci acceptable du point de vue pharmaceutique, telle que définie dans la revendication 1, qui comprend :

(a) pour préparer des composés dans lesquels

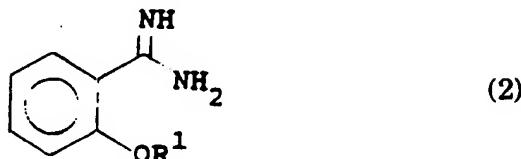
35



40

est un groupe de sous-formule (a), la réaction d'un composé de formule (2) :

45

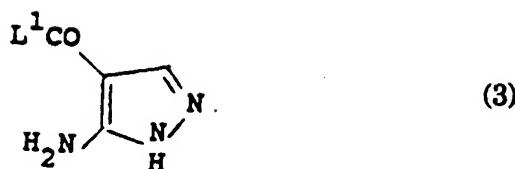


50

dans laquelle R^1 est tel que défini dans la revendication 1, avec un composé de formule (3) :

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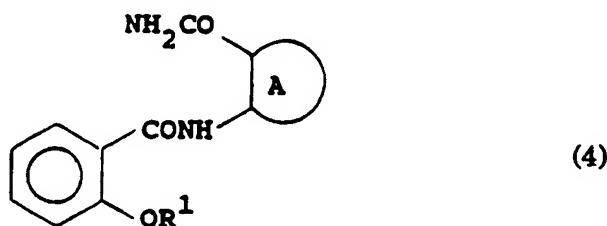
dans laquelle L¹ est un groupe alcoxy en C₁₋₄ ou amino;
 (b) pour préparer des composés dans lesquels



15

est un groupe de sous-formule (a) ou (b), la cyclisation d'un composé de formule (4) :

20



25

dans laquelle R¹ est tel que défini plus haut, et

30



35

est un groupe de sous-formule (a) ou (b) telle que définie dans la revendication 1;
 (c) pour préparer des composés dans lesquels

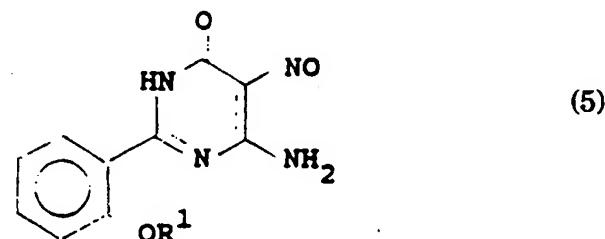
40



45

est un groupe de sous-formule (c) et X est un atome d'oxygène, la cyclisation d'un composé de formule (5) :

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55

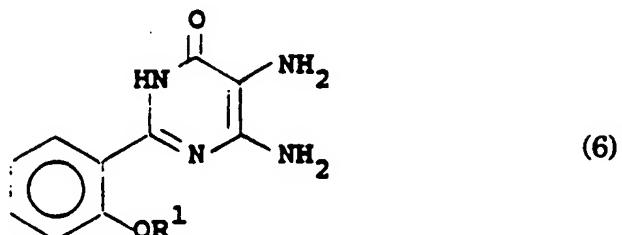
dans laquelle R¹ est tel que défini plus haut, avec un agent oxydant;

5 (d) pour préparer des composés dans lesquels



10 est un groupe de sous-formule (c) et X est un atome de soufre, la réaction d'un composé de formule (6) :

15



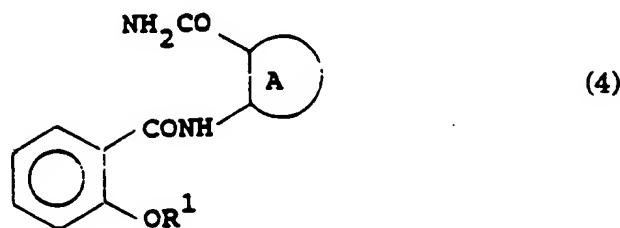
20

dans laquelle R¹ est tel que défini plus haut, avec du chlorure de thionyle ou un équivalent chimique de celui-ci;
et ensuite, la formation éventuelle d'un sel acceptable du point de vue pharmaceutique.

25

12. Composé de formule (4) :

30



35

dans laquelle :

R¹ est un groupe alkyle en C₁-₆, alcényle en C₂-₆, cycloalkyl-(en C₃-₅)-alkyle en C₁-₄, ou un groupe alkyle en C₁-₄ substitué par 1 à 6 atomes de fluor, et

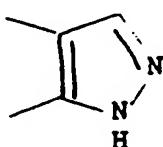
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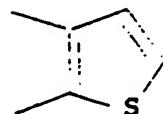
45

est un cycle représenté par la sous-formule (a) ou (b) :

50



(a)



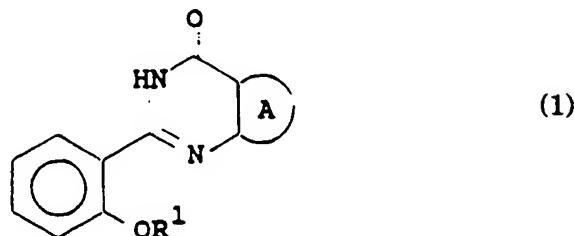
(b)

55

Revendications pour l'Etat contractant suivant : ES

1. Procédé pour préparer un composé de formule (1) :

5



10

15

ou un sel de celui-ci acceptable du point de vue pharmaceutique, dans laquelle :

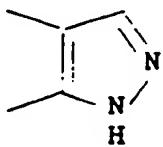
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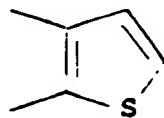
est un cycle représenté par la sous-formule (a), (b) ou (c) :

25

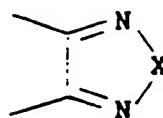
30



(a)



(b)



(c),

35

X est un atome d'oxygène ou de soufre, et

R¹ est un groupe alkyle en C₁-₆, alcényle en C₂-₆, cycloalkyl-(en C₃-₅)-alkyle en C₁-₄, ou un groupe alkyle en C₁-₄ substitué par 1 à 6 atomes de fluor.

lequel procédé comprend :

(a) pour préparer des composés dans lesquels

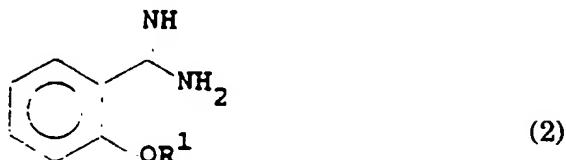
40



45

est un groupe de sous-formule (a), la réaction d'un composé de formule (2) :

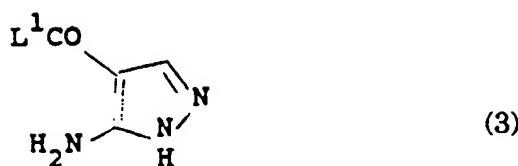
50



55

dans laquelle R¹ est tel que défini plus haut, avec un composé de formule (3) :

5



10 dans laquelle L^1 est un groupe alcoxy en C_{1-4} ou amino;
 (b) pour préparer des composés dans lesquels

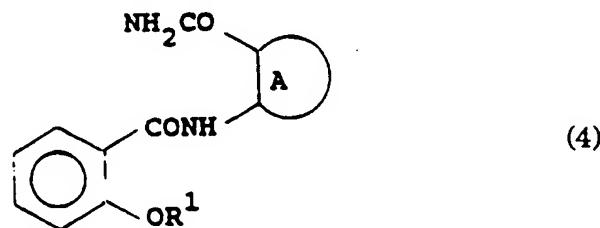
15



est un groupe de sous-formule (a) ou (b), la cyclisation d'un composé de formule (4) :

20

25



30 dans laquelle R^1 est tel que défini plus haut, et

35



est un groupe de sous-formule (a) ou (b) telle que définie plus haut;
 (c) pour préparer des composés dans lesquels

40

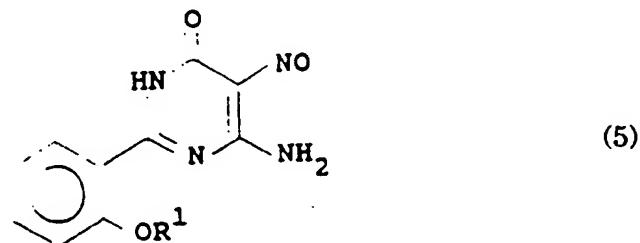


45

est un groupe de sous-formule (c) et X est un atome d'oxygène, la cyclisation d'un composé de formule (5) :

50

55



dans laquelle R^1 est tel que défini plus haut, avec un agent oxydant;

(d) pour préparer des composés dans lesquels

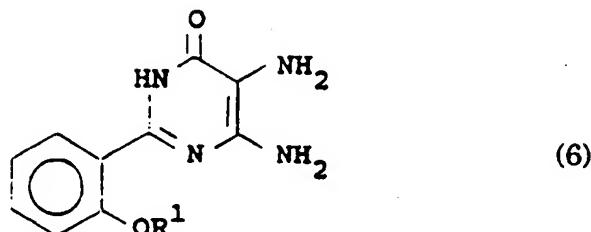
5



est un groupe de sous-formule (c) et X est un atome de soufre, la réaction d'un composé de formule (6) :

10

15



20

dans laquelle R¹ est tel que défini plus haut, avec du chlorure de thionyle ou un équivalent chimique de celui-ci;

et ensuite, la formation éventuelle d'un sel acceptable du point de vue pharmaceutique.

25

2. Procédé suivant la revendication 1, pour préparer un composé dans lequel R¹ est un groupe alkyle en C₂-5.

3. Procédé suivant la revendication 1, pour préparer un composé dans lequel R¹ est un groupe n-propyle.

30

4. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel



35

est un groupe de sous-formule (a).

5. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel

40



45

est un groupe de sous-formule (b).

6. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel

50



55 est un groupe de sous-formule (c) et X est un atome d'oxygène.

7. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel

5



est un groupe de sous-formule (c) et X est un atome de soufre.

10 8. Procédé suivant la revendication 1, pour préparer un composé qui est :

la 6-(2-propoxyphényl)-pyrazolo-[3,4-d]-4(5H)-one,
 la 6-(2-propoxyphényl)-thiéno-[2,3-d]-4(3H)-one,
 la 6-(2-propoxyphényl)-[1,2,5]-oxadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
 la 6-(2-propoxyphényl)-[1,2,5]-thiadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
 ou un sel de celles-ci acceptable du point de vue pharmaceutique.

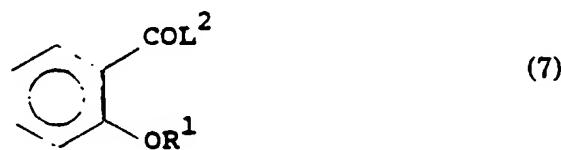
15

9. Procédé pour préparer une composition pharmaceutique, qui comprend la mise en association d'un composé de formule (1) telle que définie dans la revendication 1 et d'un support acceptable du point de vue pharmaceutique.

20

10. Procédé pour préparer un composé de formule (4) telle que définie dans la revendication 1, qui comprend la réaction de 3-amino-4-pyrazolecarboxamide ou de 2-aminothiophène-3-carboxamide avec un composé de formule (7) :

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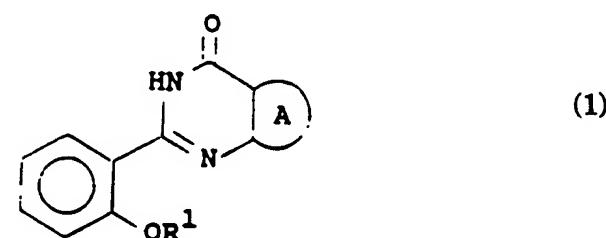
dans laquelle R^1 est tel que défini dans la revendication 1 et L^2 est un atome d'halogène.

Revendications pour l'Etat contractant suivant : GR

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1. Procédé pour préparer un composé de formule (1) :

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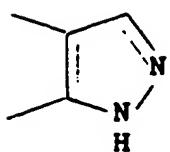
ou un sel de celui-ci acceptable du point de vue pharmaceutique, dans laquelle :

50

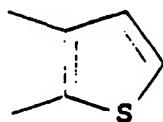


55 est un cycle représenté par la sous-formule (a), (b) ou (c) :

5



(a)



(b)



(c),

10

X est un atome d'oxygène ou de soufre, et
 R^1 est un groupe alkyle en C_{1-6} , alcényle en C_{2-6} , cycloalkyl-(en C_{3-5})-alkyle en C_{1-4} , ou un groupe alkyle en C_{1-4} substitué par 1 à 6 atomes de fluor.

lequel procédé comprend :

15

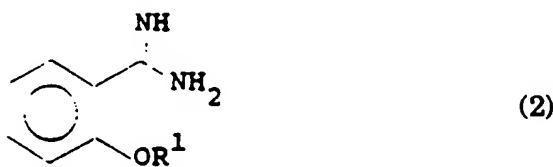
(a) pour préparer des composés dans lesquels



20

est un groupe de sous-formule (a), la réaction d'un composé de formule (2) :

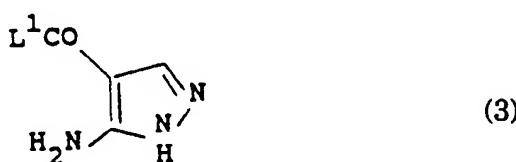
25



30

dans laquelle R^1 est tel que défini plus haut, avec un composé de formule (3) :

35



40

dans laquelle L^1 est un groupe alcoxy en C_{1-4} ou amino;
 (b) pour préparer des composés dans lesquels

45

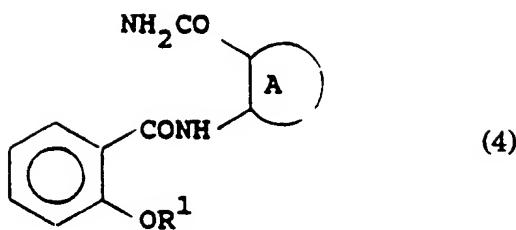


50

est un groupe de sous-formule (a) ou (b), la cyclisation d'un composé de formule (4) :

55

5



10

dans laquelle R¹ est tel que défini plus haut, et

15



est un groupe de sous-formule (a) ou (b) telle que définie plus haut;
(c) pour préparer des composés dans lesquels

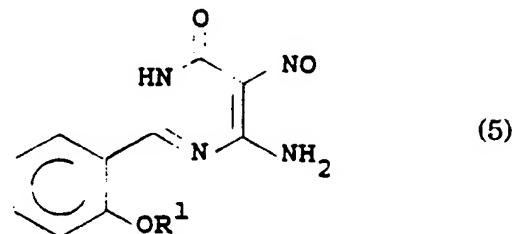
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25

est un groupe de sous-formule (c) et X est un atome d'oxygène, la cyclisation d'un composé de formule (5) :

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dans laquelle R¹ est tel que défini plus haut, avec un agent oxydant;
(d) pour préparer des composés dans lesquels

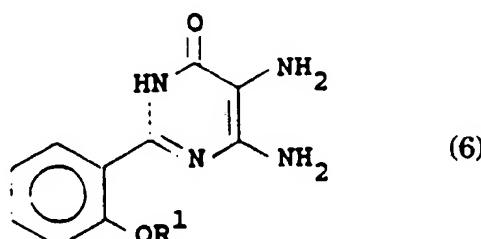


45

est un groupe de sous-formule (c) et X est un atome de soufre, la réaction d'un composé de formule (6) :

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dans laquelle R¹ est tel que défini plus haut, avec du chlorure de thionyle ou un équivalent chimique de celui-ci;
et ensuite, la formation éventuelle d'un sel acceptable du point de vue pharmaceutique.

5 2. Procédé suivant la revendication 1, pour préparer un composé dans lequel R¹ est un groupe alkyle en C₂-5.

3. Procédé suivant la revendication 1, pour préparer un composé dans lequel R¹ est un groupe n-propyle.

10 4. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel



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est un groupe de sous-formule (a).

5. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel
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est un groupe de sous-formule (b).

6. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel
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est un groupe de sous-formule (c) et X est un atome d'oxygène.

7. Procédé suivant l'une quelconque des revendications 1 à 3, pour préparer un composé dans lequel



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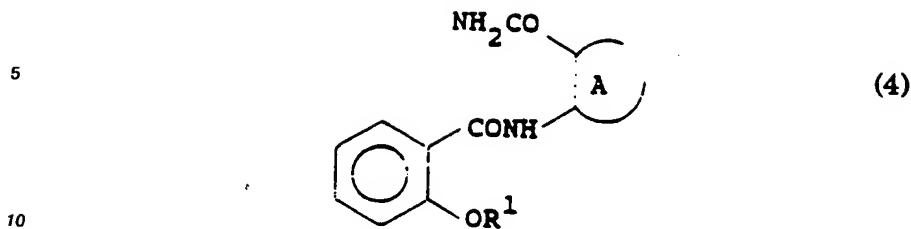
est un groupe de sous-formule (c) et X est un atome de soufre.

45 8. Procédé suivant la revendication 1, pour préparer un composé qui est :
la 6-(2-propoxyphényl)-pyrazolo-[3,4-d]-4(5H)-one,
la 6-(2-propoxyphényl)-thiéno-[2,3-d]-4(3H)-one,
la 6-(2-propoxyphényl)-[1,2,5]-oxadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
la 6-(2-propoxyphényl)-[1,2,5]-thiadiazolo-[3,4-d]-pyrimidin-4(3H)-one,
50 ou un sel de celles-ci acceptable du point de vue pharmaceutique.

9. Procédé pour préparer une composition pharmaceutique, qui comprend la mise en association d'un composé de formule (1) telle que définie dans la revendication 1 et d'un support acceptable du point de vue pharmaceutique.

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10. Composé de formule (4) :



dans laquelle :

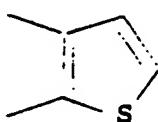
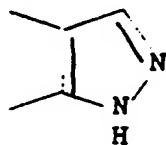
15 R^1 est un groupe alkyle en C_{1-6} , alcényle en C_{2-6} , cycloalkyl-(en C_{3-5})-alkyle en C_{1-4} , ou un groupe alkyle en C_{1-4} substitué par 1 à 6 atomes de fluor, et

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est un cycle représenté par la sous-formule (a) ou (b) :

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(a)

(b)

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